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The Effects of Descriptive Imagery and Appeals on Emotions and Intentions Related to Pro-Environmental Behavior

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Abstract: The aim of the present study is to assess whether reinforcing imagery affects the emotional valence and effectiveness of pro-environmental public service announcements (PSAs). Two experiments that utilized PSAs constructed from a combination of text-based appeal and an image were carried out. The first experiment used the following appeals; (1) highlighting injunction, (2) highlighting injunction together with a negative descriptive norm, and (3) highlighting injunction together with a positive descriptive norm. These appeals were written on a photograph that either depicted nature scenery or the same scenery with digitally added litter. The results of the first experiment demonstrated that a congruent combination of text appeals highlighting injunction together with a positive descriptive norm and positive descriptive imagery elicits the most positive emotions when compared to other appeal and image combinations. The second experiment demonstrated that appeals with positive descriptive norms and an injunctive message coupled with a congruent descriptive image affect behavioral intention more than appeals with an injunctive only message coupled with a congruent descriptive image, thus demonstrating the additive effect of descriptive imagery and appeals presented together.

Keywords: social norms; public service announcement; subjective evaluation; pro-environmental behavior; emotion

1. Introduction

It is widely accepted that social norms are among the most effective means of encouraging desirable behaviors [1,2]. Social norms have been extensively used in promoting pro-environmental behaviors in various settings and have been found to be very effective [3,4]. Pro-environmental behavior can be defined as any behavior that is neutral or beneficial to the natural environment. Actions that unavoidably have negative consequences for the environment but are the least harmful alternative (e.g., choosing train travel instead of flying) can be considered pro-environmental behavior as well. The effects of social norms on pro-environmental behavior receives continued interest from researchers in search of ways of how various subcategories of norms function when compared to one another, as well as in different contexts, and how to make them more effective in general [5–8].

Social norms indicate adaptive behavior and have a regulatory function on the community level. Thus, individuals are compelled to follow social norms in order to function properly in society. Perhaps the most widely researched types of norms are descriptive and injunctive social norms [6,9]. Injunctive norms are related to behavior that is preferred by society, while descriptive norms refer to the actual behavior of other people. The motivation for following descriptive and injunctive social norms is different. Injunctive norms, being the subjectively perceived rules of behavior, compel one to comply

because such behavior promises rewards (e.g., increased acceptance by peers), whereas defying carries the risk of punishment (e.g., removal from the community) [10,11]. Descriptive norms, however, reflect the perceived behaviors of others in similar situations, thus they compel one to conform and act according to examples of adaptive behaviors [9]. When one is confronted with an incongruence between descriptive and injunctive social norms, one tends to act as others do, not as the rules require [12–14], because the descriptive norm both provides a reference behavior in an uncertain situation and signals a possible social pressure in case of nonconforming behavior. Conforming behavior is further reinforced by the seeming lack of punishment for breaking the injunction in the described behavior. That is why following social norms functions as heuristics for behavior, having informational social influence and reducing the cognitive load when deciding upon an action. Moreover, social norms are rarely perceived by the observer as influencing one's behavior [15,16], making them a key component in successful public service announcements (PSAs), as they are not seen as pressuring one into behaving.

Sustainable development requires both infrastructural and attitudinal changes if we are to transition toward environmentally sustainable practices and growth. Additionally, sustainable development is not limited to access to certain behaviors (e.g., the availability of trash receptacles to prevent littering), it also includes making sustainable practices pleasant and ensuring that engagement in sustainable behavior adds to one's well-being as well [17]. If done well, PSAs (informational ads and communication that highlight socially relevant issues) are an effective way to induce behavioral changes [10], thus contributing to sustainable development in making environmentally beneficial behaviors more prevalent and fostering positive attitudes toward these behaviors. That is why they are often used to promote pro-environmental and other prosocial behavior. However, to succeed, the message of a PSA should be simple and very specific in the proposed solution of a problem [18]. This is especially important in PSAs combining several multimedia elements (e.g., text combined with images). Modern PSAs are rarely text-only, so it is vital to consider congruency between words and accompanying imagery.

1.1. Use of Images in Normative PSAs

Normative messages, when used in a deliberate manner to promote desired behavior, usually are presented in some sort of attractive manner and there is at least some subjective element of visual design involved [4,8]. Although normative interventions are almost universally effective regardless of their presentation, their presentation and the visual stimuli presented alongside the appeals might play an important role in how observers engage with the stimuli in general.

In addition to possible contradiction between text message and visual message, it is also important to consider the well-established affective influence of images [19,20]. The affective component of a pro-environmental PSA is an important, yet untapped, factor of its effectiveness. There is recent research that indicates that pro-environmental behaviors that elicit positive feelings are more likely to be repeated [21] and that anticipated pride is more effective in eliciting behavioral change than anticipated guilt [22]. Additionally, previous research that used *kawaii* (cute) imagery (intended to elicit positive affect) as a part of a norm-based PSA has shown high effectiveness and behavioral spillover to untargeted pro-environmental behaviors [23]. Thus, there are at least two reasons for eliciting positive affect with pro-environmental PSAs: first, they increase the likelihood the PSA will be viewed repeatedly, thus increasing the exposure and salience of its contents [24,25]; second, positive affect is pleasant and sought after and thus the observers will associate positive emotions with pro-environmental behaviors, increasing the likelihood of performing them [21]. It must be noted that many contemporary pro-environmental PSAs use imagery that elicits negative emotions, which might be counterproductive to the cause since negative emotions increase the likelihood of avoidance behavior [26]. Thus, emotional valence is an important factor in PSA creation and needs to be further investigated in combination with normative appeals in order to determine the most effective combination of stimuli for behavioral change.

There is no doubt that "magnitude of affect" plays a significant role in the effectiveness of a PSA, but it is not as simple as presenting pictures of cute animals next to a normative message [25]. An engaging and positive image might increase the likelihood of repeated viewings, but if the imagery is not related to the message being presented; this incongruence might lead to suboptimal functioning of a PSA. Therefore, it might be useful to use positive imagery that is directly related to the normative message—a pleasant image reinforcing the norm that is written in the appeal. An emotionally positive image that also reinforces the normative appeal might work on at least two levels: making salient the norm that is being presented, thus increasing the likelihood of repeat viewings, and increasing viewing time. We believe that using such imagery can help in creating more effective pro-environmental PSAs.

The stimulus and its characteristics alone, however, are only part of what affects the effectiveness of a given PSA. The same PSA might have a different effect for different individuals, thus understanding and controlling for individual differences in this context is also relevant. Further we will discuss the role of trait openness, biospheric values, and moral norms in the context of pro-environmental behavior.

1.2. The Role of the Trait of Openness

Recently, there has been a call for a paradigm shift when investigating individual personality differences in pro-environmental behavior research [27]. The newly proposed view urges not to search for linear relationships between traits and pro-environmental behavior, but to take personality trait patterns as indivisible units of analysis and investigate what effects apply to these groups. This view is grounded in both evolutionary theory and the person-oriented approach [27], and there already is some compelling evidence of the differential effectiveness of pro-environmental PSAs for different individuals, characterized by the patterns of their personality traits [23].

The trait of openness seems to play a particularly important role in understanding pro-environmental behavior [23,27–30]. The trait of openness describes one's proclivity to seek out and engage in novel ideas, behaviors and experiences [31]. Pro-environmental behavior can be considered one of these novel practices, as human ancestors did not encounter the environmental problems we are experiencing today [23,27]. Individuals with personality trait profiles characterized by high scores of openness (and other socially desirable traits) tend to act more pro-environmentally [23,28] and are highly persuaded by norm-based PSAs targeting pro-environmental behaviors [23]. In general, more open individuals more readily accept novel ideas and practices and more easily engage in uncommon behaviors [31]. Thus, when promoting pro-environmental behavior, it may be that highly open individuals will be more likely to change their beliefs and actions than individuals who are not open. Although, in the present study, we do not adopt a person-oriented perspective, we aim to at least control for individual variance in trait openness to remove some of its confounding effects.

1.3. Biospheric Values and Moral Norms

Values are guiding principles that have a strong innate component [32], and thus can be seen as an individual difference variable. Our values, whether we are consciously aware of them or not, help us navigate our everyday situations and make behavioral decisions, in a sense acting as a mechanism of reducing cognitive load and increasing consistency in behavior. Values, similarly to personality traits, are adaptive strategies of consistently striving for individually desirable proximal and ultimate goals [27,32,33]. Biospheric values are oriented toward our love of nature and our willingness to put nature in the forefront of our concerns. Values, especially biospheric values, are often used as predictors of pro-environmental behavior and related pro-environmental outcomes [34,35]. In contrast, moral norms related to pro-environmental actions (often called "personal norms") are the subjective moral obligation to act pro-environmentally [35]. Moral (personal) norms form through the interaction of our innate traits with our environment, providing a more crystalized set of rules for behavior that we see as desirable. Moral norms have the potential to change over time based on changing environments; however, already internalized moral norms act as guiding principles in novel situations and it takes some time for them to change. In the present study, we focus on immediate emotions that arise when a

PSA is observed and assume a direct effect of the stimulus toward the intention to follow the behavior highlighted in the PSA [6,9]. We assumed that if normative stimuli work through innate processes that compel us to follow adaptive behaviors, we should observe short-term and situation-specific changes. Although this can only be tested longitudinally, we opted to gather preliminary results by assessing behavioral intentions, biospheric values, and littering moral norms. We proposed that if normative stimuli have a direct situation-specific effect, then we should see significant changes in the observer's intentions, but not biospheric values or moral norms, as both moral norms and values take time to develop in an individual before they are internalized.

1.4. The Present Studies

Most PSAs are designed by advertising agencies that are used to designing commercial advertising. In commercial advertising, it is often enough to increase brand recognition so that the consumers, when faced with the decision of which products to buy, will choose the ones with which they are more familiar with. This is achieved through informing consumers about the product and making sure that the ad has a high chance of repeated viewings (e.g., by making it humorous and entertaining). However, the expertise needed for commercial advertising is not necessarily useful in designing PSAs, because noncommercial advertisements do not promote a brand or a product; they promote a behavior that is often unpopular, sometimes even difficult, costly, or unpleasant. In addition, PSAs often transmit a message that promotes certain values or beliefs, some of which might be unpleasant to the viewers, thus adding to the complex task of balancing the effects of the PSA so that it is not perceived as preaching or pressuring. PSAs designed by commercial ad companies utilizing their usual tools and practices lead to inefficient, and thus unsustainable use of resources, which is contrary to the principle of sustainable development both in terms of wasting resources and in potentially decreasing the likelihood of desirable behaviors and positive attitudes toward them, ultimately resulting in a decrease in overall societal well-being [17]. We suggest that a different set of guiding principles and knowledge is critically needed by practitioners who engage in creating pro-environmental PSAs. The literature relevant to this topic is scarce and far between, with only a few recent examples of studies that provide useful insights for those who wish to create evidence-based pro-environmental PSAs, e.g., the work by the authors of [26].

Although there is ample information on how normative messages should be formulated, there seems to be a lack of practical guidelines on how these messages should be presented visually and what images should accompany them (if any). Additionally, there is little knowledge of how the emotional valence of images affects the observer's intention to engage in pro-environmental actions. What emotions should designers strive to elicit when designing these types of PSAs? What should the visuals of a PSA depict? These are the practical questions this article intends to tackle.

The aim of the present study is to assess whether reinforcing imagery affects the emotional valence and effectiveness of pro-environmental PSAs. Our working hypothesis, with images that depict a clean natural environment, will elicit the most positive emotions (e.g., amusement, pride, joy, contentment, and similar); we also predicted that images that are incongruent with their accompanying appeals will elicit less positive emotions; our final working hypothesis was that positive images with congruent positive appeals will have the most positive emotional valence of all stimuli and will affect intention to act pro-environmentally better than a positive image coupled with an alternative appeal.

The present study was also exploratory in nature; therefore, we looked at how different appeals affect perceived norms and values, and how the trait of openness moderates the effects of the appeals.

2. Study 1—Emotional Valence of Different Appeals and Visual Stimuli

This study was intended to explore what emotions emerge when observing PSAs with different appeals and images. We sought to find out which combination of appeal and image elicits the most positive emotions, thus preventing aversion to the stimulus and potentially increasing viewing time and view count, as well as engagement in the image.

2.1. Method

2.1.1. Participants

A convenience sample of college students participated in this study. A total of 348 participants were recruited. Participants were mostly female (n = 260; 74.71% of the total sample). Participant age ranged from 18 to 36 years of age, with a mean age of 19.71 (1.37). The study was conducted in Lithuania.

2.1.2. Procedure

Consent was obtained from both the institution where the research was conducted and from the participants. The survey was anonymous. Participants were informed that they could revoke their consent to participate in the study at any point (no individuals declined to participate). Several surveys were conducted during prearranged times in several lecture halls.

Participants were asked not to talk or discuss the questionnaire until everyone had filled it in. The questionnaire and the stimuli were handed out in parts following a strict order. First, researchers handed out a large envelope and a sheet of paper with the first part of the questionnaire; participants were instructed to fill in the questionnaire on the sheet and to put the sheet in the envelope. Participants were asked to put their hands up after each part of the survey when they had filled in all presented materials and put them in the envelope. Second, the researchers instructed the participants that now they will be handed out two sheets—one containing a questionnaire about emotions and one containing a picture; participants were asked to look at the picture and to consider what emotions arise when looking at it. Last, the participants were handed out another sheet with a questionnaire and were once again asked to fill it in. After everyone had completed the survey, the researchers answered any questions that the participants had about the survey.

The stimuli handed out during the second step of the survey were prearranged in a pile in repeating order of the six possible stimuli of the study; thus, taking one from the top and handing it out would result in a random distribution of stimuli to the participants (the stimuli were handed out in the sequence the participants were sitting in, starting from the first row and going toward the end of the classroom). The students sat in classrooms in no particular order and none were aware that they received different stimuli or what the stimuli of other conditions were.

Every participant was given a souvenir pencil as a small reward for their participation in the study.

2.1.3. Materials

To ensure a predictable affective impact, the main image used in a study was taken from the GAPED (Geneva affective picture database) image database [19]. It was a positive valence photo depicting a field with some trees (GAPED image P093). The image was either used in its original version (as positive descriptive imagery, providing an example of pro-environmental behavior) or digitally manipulated to look as if there are heaps of trash in the field (as negative descriptive imagery, providing an example of environmentally harmful behavior). Three textual appeals were constructed: (1) highlighting only the injunction, (2) highlighting a negative descriptive norm and an injunction, and (3) highlighting a positive descriptive norm and an injunction. This resulted in a 2 × 3 design with a total of 6 possible stimuli that could be presented to the study participants (Appendix A).

We assume that observers are already aware of the injunction that they should not litter as it is both common knowledge and reinforced by law. Thus, we make injunctive norms salient by simply reminding observers of the injunction of not littering with the words “do not litter”. For descriptive norm activation we used either “forests are filling up with litter” (indicating a negative descriptive norms) or “forests are becoming cleaner” (indicating a positive descriptive norm). The descriptive norm stimuli of the present study describe the prevalent trend of behavior [36].

2.1.4. Measures

All measures were presented in the order they are described here. No other measures were used in the study. Only age and sex were gathered as demographic variables.

The trait of openness was assessed with the 10-item openness scale from the Big Five Inventory [37]. Items were rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree". The scale demonstrated good internal consistency (Cronbach's $\alpha = 0.81$). We used a Lithuanian translation of the scale previously used in other studies [28].

The Geneva Emotion Wheel (GEW) [38] was used to assess emotions that arise when looking at stimuli. The standard GEW instruction was preceded by this statement (originally presented in Lithuanian): "We are interested in understanding what emotions arise in you when you are looking at the picture on the other sheet. Often, we feel a lot of different emotions at once. Please tick the appropriate circle in the wheel below for each emotion that arises when viewing the picture." Participants had to rate their emotions by marking their affective experience on a wheel, that shows 20 emotion families arranged in a circular pattern and representing two emotion dimensions: valence and control. The third dimension—Intensity—was represented by the size of a circle that has to be marked. Each of the 20 emotion families were represented by five circles ranging from large, to small. If none of the presented emotions were suitable, participants had an opportunity to either choose an option "None" or select "Other" and indicate their emotion by naming it themselves.

Moral norms related to littering behavior were assessed with items based on Poškus [39]. Four items were rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree." Items were worded in such a way to address the moral component of littering: "My beliefs urge me not to litter." "Everyone should be engaged in cleaning up the environment from litter." "It would make me a bad person if I littered." "I would feel guilty if I littered." The scale demonstrated good internal consistency (Cronbach's $\alpha = 0.77$).

Biospheric values were assessed with items adapted from Lee [34]. Four items were rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree". The four items used in the study were "Humans should not harm the beauty of nature," "Nature is very beautiful," "It saddens me when people harm nature for personal gain," and "People should live in harmony with nature." The scale demonstrated good internal consistency (Cronbach's $\alpha = 0.86$).

2.1.5. Analysis

To investigate whether different conditions resulted in differences in emotion scores we ran 2 by 3 analysis of covariance (ANCOVAs) for all emotions and used age, sex, and openness as covariates to control for possible confounding effects of individual differences. The same procedure was used to investigate whether scores of biospheric values and moral norms differed among study conditions.

2.2. Results

A series of 2 by 3 ANCOVAs has demonstrated that different image and appeal combinations evoked different emotions (see Appendix C). The dependent variables were not normally distributed; however, the residuals of all analyses were approximately normally distributed. The data were visually inspected for homogeneity of regression slopes—the assumption was met. We must bear in mind that with small samples and many analyses there is a higher possibility of Type I error, therefore the results should be interpreted with caution and treated not as definitive, but as exploratory. All effects were statistically significant, except the main effect of appeal type for the emotions of contempt and hate and interaction effects for the emotions of interest, love, admiration, and relief. The GEW profile for each condition is presented in Figure 1, where the effects of image and appeal type are apparent, especially the fact that the combination of text appeals highlighting injunction together with a positive descriptive norm and positive descriptive imagery evoked the most positive emotions.

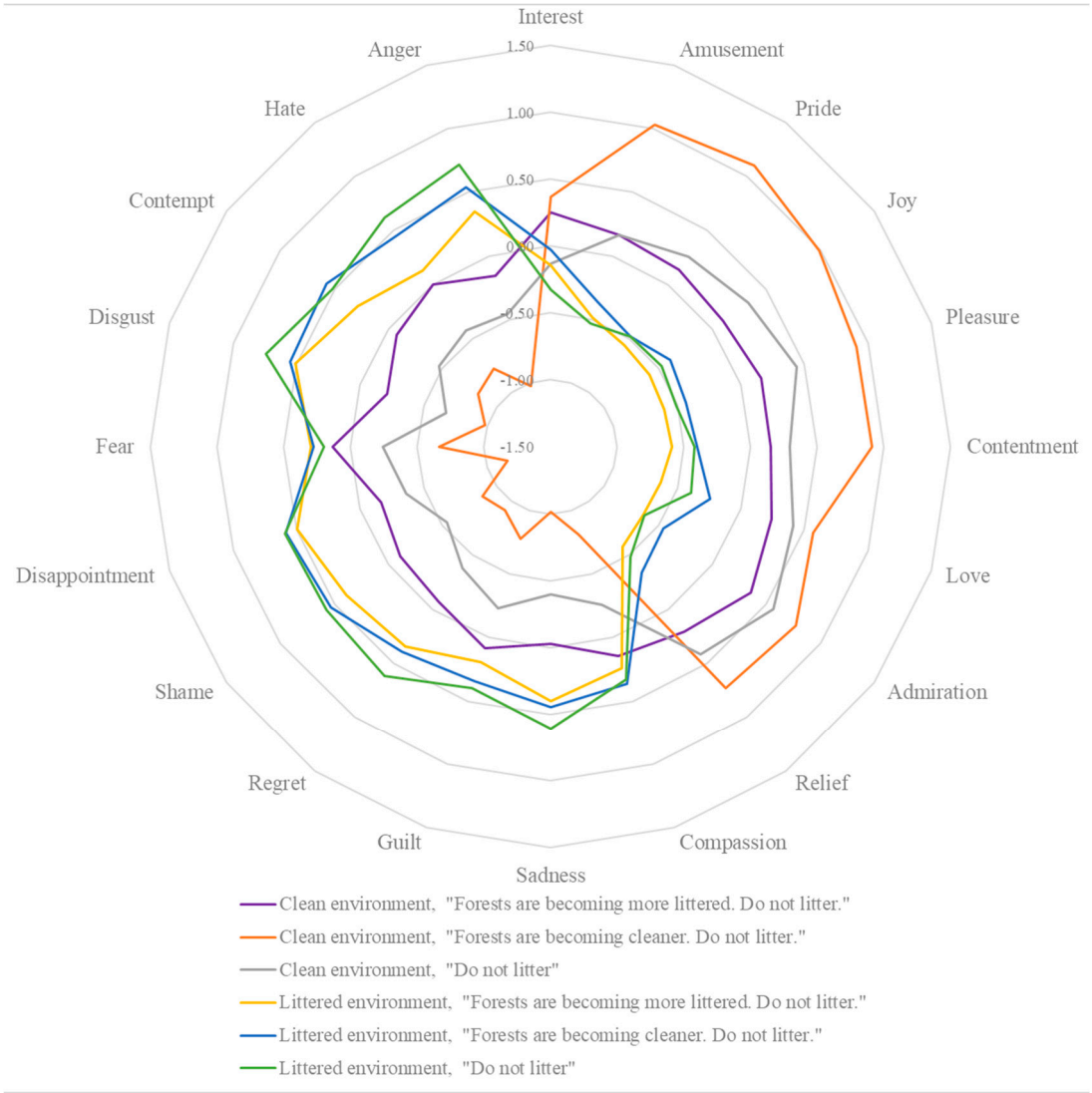

Figure 1. Emotional profiles of all stimuli used in the study. Type of image is indicated first in the legend, followed by the appeal used for that stimulus. Results are presented in Z-scores.

Further exploratory analyses were run to investigate whether the stimuli had an effect on the participants' perceived moral norms of littering and their biospheric values. The analyses were 2 by 3 ANCOVAs with age, sex, and openness as covariates (descriptives presented in Table 1). As with the prior analyses, core assumptions were met. Analyses indicated that neither moral norms regarding littering, nor biospheric values differed among different study conditions (see Tables 2 and 3).

Table 1. Descriptive statistics of the measures of openness, moral norms, and biospheric values.

	M (SD)	*r*			
		1.		2.	
1. Biospheric values	4.70 (0.51)	-			
2. Moral norms	4.28 (0.65)	0.653	*	-	
3. Openness	3.79 (0.56)	0.284	*	0.295	*

Note. * $p < 0.001$.

Table 2. Analysis of covariance (ANCOVA) results for biospheric values.

Cases	Sum of Squares	*df*	Mean Square	*F*	*p*
Type of appeal	0.036	2	0.018	0.075	0.928
Type of image	0.017	1	0.017	0.072	0.789
Appeal*Image	0.122	2	0.061	0.253	0.777
Openness	6.048	1	6.048	24.992	<0.001
Age	0.106	1	0.106	0.440	0.508
Sex	0.545	1	0.545	2.250	0.135
Residual	80.826	334	0.242		

Table 3. ANCOVA results for moral norms.

Cases	Sum of Squares	*df*	Mean Square	*F*	*p*
Type of appeal	0.246	2	0.123	0.325	0.723
Type of image	0.014	1	0.014	0.038	0.846
Appeal*Image	0.417	2	0.208	0.550	0.577
Openness	10.728	1	10.728	28.312	<0.001
Age	0	1	0	0	0.995
Sex	1.523	1	1.523	4.020	0.046
Residual	126.559	334	0.379		

2.3. Discussion

The literature on the effectiveness of normative stimuli on behavior is quite extensive, and the consensus is that normative stimulation is very effective in eliciting desired actions (pro-environmental or otherwise) [2,40]. What was lacking is the understanding of what emotions do combinations of normative appeals elicit and whether normative appeals elicit positive or negative emotions. Recent research, for example, has found that normative appeals are viewed by naïve observers as ineffective and as nagging [41]. Moreover, norms can be reflected both in text and images of the PSAs. Incongruence can lead to confusion and more arduous cognitive processing, which can result in more negative affective reactions [42]. Thus, it was hypothesized that congruent appeal and image combinations will evoke more positive emotions. In the present study, we found that a mixture of positive descriptive and injunctive appeals coupled with a positive descriptive image (hypothesized to be the most effective condition) elicits the most pleasant emotions. Thus, it seems that PSAs that are based on the effectiveness principles outlined in the literature [10,23] are effective not only in the sense of their effectiveness as normative influence, but in the sense that it is the most emotionally appealing presentation of a prosocial message as well.

The interaction effects of image type and appeal were significant for almost all emotions measured by the GEW. These findings suggest that the combination of visual and textual stimuli could potentially go above the effectiveness of just one or the other. We did not have conditions that looked at separate effects of just text or just imagery, thus we must refrain from drawing a definitive conclusion whether imagery and textual appeals highlighting congruent social norms indeed go beyond the effect of just one of these stimuli; however, the results look promising and merit future investigations into this. Nevertheless, our data suggest that descriptive imagery and normative appeals that show positive examples of behavior elicit overall pleasant emotions. This has tremendous practical implications for PSA creation, since many PSAs nowadays tend to focus on the negative and are designed by artists (who rely on their gut-feeling), rather than by behavioral scientists who rely on scientific knowledge [41].

Taking a qualitative look at how the emotion profiles differ among various conditions, we can see a pattern emerging. In all the conditions which included an image of a forest filled with litter, no matter the appeal, the emotional profiles were overwhelmingly negative. This suggests that imagery might be the most salient part of the presented stimuli and thus contributed to the bulk of the observed effects. However, when we investigate the profiles of the conditions that included a clean forest, appeal type

seems to have additional value, since there is a marked decrease in negative and an increase in positive emotions for the condition that had a positive descriptive appeal with the positive descriptive image as a background, while conditions with alternative appeals were less positive and more negative.

Note that there were no significant interaction effects for emotions of interest, love, admiration, and relief. The more abstract nature of these emotions might make them hard to elicit as easily. However, the emotion profiles suggest that interest, love, admiration, and relief follow the same trend as other positive emotions; therefore, there is some reason to believe that the investigated effects could become statistically significant in a larger sample that has more statistical power.

Additionally, the effect of the different combinations of stimuli were explored for biospheric values and moral norms related to littering. The fact that the stimuli did not have any significant effects on values or moral norms, yet affected emotions, provides some support to the assumption that normative stimulation has a more direct relation to emotions than to moral norms or values. This assertion, however, needs to be taken with caution because both values and moral norms were assessed without relating them to the observed image, whereas emotions were rated in relation to the stimulus. Nevertheless, normative stimuli have the potential to affect individual regardless of their values or moral norms and thus have the potential to be universally effective [2]. Note that the analysis controlled for the trait of openness, participant age, and sex, all of which might be important factors in value and moral norm formation. Thus, future research should look into this through a more individual-centered perspective [27].

3. Study 2—The Effect of Different Appeals on Behavioral Intention Not to Litter

Study 1 demonstrated the emotional effect of different appeals and images. Although affective influence is an important component of an effective PSA and is related to other components, such as attitudes [43], it does not necessarily lead to behavioral change. That is why in Study 2, we took the most effective conditions of Study 1 and sought to understand whether affective influence transforms into desirable intentions. We tested the effects of two stimuli, both of which showed positive descriptive imagery, but the appeals differed: one image was accompanied only by an injunction, while the other image had a descriptive and an injunctive message as well.

3.1. Method

3.1.1. Participants

A convenience sample of college students participated in this study. A total of 94 participants were recruited (63 females; 67% of the total sample). Participant age ranged from 19 to 21 years of age, with a mean age of 19.39 (0.59). Two participants did not fill some parts of the questionnaire and their results were excluded from analyses.

One participant indicated that their parents' highest attained education is unfinished high-school, 15 indicated that their parents highest education was a high-school diploma, 31 indicated a professional bachelor's degree from a college, 31 indicated a bachelor's from a university, 10 indicated a master's degree, 1 indicated a doctoral degree, and 5 did not indicate their parents' highest attained education.

3.1.2. Procedure

The procedure of this study was similar to that of Study 1. The only difference was that participants had to fill in other types of measures. The first sheet of the questionnaire was handed out together with a large envelope and the participants were instructed to put the filled in sheets in the envelope and raise their hands upon doing that. A total of five sheets were handed out in this manner to each participant. Half of the participants randomly received the A1 stimulus, and the other half received the A3 stimulus (see Appendix A).

The order and contents of the five sheets was as follows; (1) age, sex, and openness; (2) perceived descriptive, injunctive, and moral norms of littering and biospheric values; (3) a problem of counting

triangles (to produce cognitive load and facilitate forgetting of previous scales), a cognitive reflection test, and a question asking to indicate parental education; (4) one of the two visual stimuli is presented with a scale to rate the intention not to litter; and (5) participants again rated their perceived descriptive, injunctive, and moral norms of littering and biospheric values (the order of the items was inverted internally in each scale, but the order between different scales was preserved).

Every participant was given a souvenir pencil as a small reward for their participation in the study.

3.1.3. Materials

Two images from the Study 1 (A1 and A3, see Appendix A) were used as the stimuli for this study. An image of intersecting triangles was used to induce cognitive load in participants in order to facilitate forgetting of previous questionnaire items (Appendix B).

3.1.4. Measures

Information about participants' age, sex, and highest parental education were gathered as demographic variables.

The trait of openness was assessed with the openness scale from the Big Five Inventory [37]. Items were rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree". The scale demonstrated good internal consistency (Cronbach's $\alpha = 0.74$).

Perceived descriptive and injunctive norms were assessed with 4 items each, and were all rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree." The injunctive and descriptive items were similar in their wording, but addressed either descriptive or injunctive norms. The four descriptive norm items were: "most people do not litter", "most parks and forests are filled with trash", "most people leave nature unlittered after their visit there", and "people rarely litter in forests". Corresponding injunctive norm items were: "people should not litter", "people should not throw trash in parks or forests," "people should leave a clean environment after their nature visit", and "people should not litter in forests". The items were based on previous research and were presented in random order to minimize question order effects [44]. In the pre-stimulus measurement, the internal consistency of descriptive norms was moderate-to-low (Cronbach's $\alpha = 0.57$), while the internal consistency of injunctive norms was good (Cronbach's $\alpha = 0.77$). In the poststimulus measurement, the internal consistency of descriptive norms was good (Cronbach's $\alpha = 0.80$), whereas the internal consistency of injunctive norms was very high (Cronbach's $\alpha = 0.90$).

Intention not to litter was assessed with one item presented under the stimulus, rated on a 10-point Likert scale from 1 "I am certain I will litter" to 10 "I am certain that I will not litter."

Moral norms and biospheric values were assessed with the same items as in Study 1, all rated on a 5-point Likert scale from 1 "completely disagree" to 5 "completely agree." One of the items in the moral norms scale functioned poorly in the pre-stimulus measurement and was taken out of the scale for both pre- and poststimulus measurements. In the pre-stimulus condition, the moral norm scale showed sufficient internal consistency (Cronbach's $\alpha = 0.69$), while the biospheric value scale showed good internal consistency (Cronbach's $\alpha = 0.82$). In the poststimulus condition, the moral norm scale showed good internal consistency (Cronbach's $\alpha = 0.76$), as did the biospheric value scale (Cronbach's $\alpha = 0.81$).

The Cognitive Reflection Test (CRT) [45] was used to measure participants' cognitive reflection. Cognitive reflection is a cognitive ability describing one's proclivity to engage in deep thinking and not to settle for intuitive solutions. This test was used for both inducing cognitive load and to indirectly obtain a rough measure of the participants' general intelligence [46] that could be used as a control variable. The test is comprised of three items that are easy to answer but require deeper, non-intuitive thinking. The answers were coded either 1 (correct answer) or 0 (incorrect answer), each participant's individual score was computed by adding up the number of correct answers with a maximum possible score of 3.

3.1.5. Analysis

First, we tested whether the two groups that received different stimuli were different regarding possibly confounding characteristics (trait openness, CRT, parental education, age, and sex). Most variables did not meet the requirements for distribution-sensitive hypothesis testing, and therefore distribution-independent tests were used to compare intention between groups as well as pre- and poststimulus scores.

3.2. Results

Group differences were assessed to determine group equivalency and it was found that both groups did not differ in their trait of openness ($t(90) = 1.31$, $p = 0.193$), parental education ($\chi^2(6) = 9.722$, $p = 0.137$), or their CRT results ($\chi^2(3) = 0.882$, $p = 0.830$), and therefore any confounding effect of openness or intelligence on the results is unlikely or at least would be very small [27]. The sexes were also equally distributed among both conditions ($\chi^2(1) = 0.791$, $p = 0.374$).

Comparing the intention to avoid littering, an independent samples test (Mann–Whitney) indicated that the group that received positive descriptive images accompanied with both injunctive and positive descriptive appeals rated their intention not to litter statistically significantly higher (M = 9.48 (0.89)), compared to the group that received positive descriptive images accompanied only by injunctive appeals (M = 8.87 (1.64)): $U = 790$, $p = 0.020$, $rrb = -0.253$, $d = -0.46$.

To test whether presented stimulus had an effect on the measures of descriptive, injunctive, and moral norms as well as biospheric values, four Wilcoxon signed-rank tests were run (descriptives presented in Table 4). Only injunctive norms were affected ($W = 416.0$, $p = 0.004$, $rrb = -0.797$): injunctive norms after stimuli presentation were rated lower compared to initial injunctive norm ratings. However, no significant differences were found while comparing descriptive norms ($W = 775.5$, $p = 0.152$, $rrb = -0.629$), biospheric values ($W = 188.5$, $p = 0.480$, $rrb = -0.908$), and moral norms ($W = 481.0$, $p = 0.514$, $rrb = -0.765$). These results indicate that, apart from possible priming effects for injunctive norms [44], neither stimulus elicited any immediate change on the internalized norms and values of the participants.

Table 4. Descriptive statistics and correlations of the pre- and poststimulus measures of social and moral norms, and biospheric values.

Variables	M (SD)	*r*						
		1	**2**	**3**	**4**	**5**	**6**	**7**
1. PRE Descriptive norms	2.623 (0.613)	-						
2. PRE Injunctive norms	4.830 (0.426)	−0.066	-					
3. PRE Biospheric values	4.652 (0.442)	0.018	0.058	-				
4. PRE moral norms	4.156 (0.698)	0.010	−0.058	0.537 **	-			
5. POST Descriptive norms	2.683 (0.764)	0.772 **	−0.273 *	−0.093	−0.085	-		
6. POST Injunctive norms	4.728 (0.436)	0.078	0.302 *	0.463 **	0.291 *	−0.042	-	
7. POST Biospheric values	4.650 (0.438)	−0.001	0.155	0.850 **	0.455 **	−0.110	0.609 **	-
8. POST moral norms	4.130 (0.772)	0.093	0.014	0.428 **	0.861 **	0.024	0.456 **	0.493 **

Note. * $p < 0.01$, ** $p < 0.001$. PRE indicates pre-stimulus measures; POST indicates poststimulus measures.

It must be noted that the internal consistency of descriptive and injunctive norm scales changed substantially between pre- and poststimulus measures. The aforementioned change might have been due to the respondents wanting to be consistent when filling in the measure the second time; however, it also might be an indication of the respondents' reaction to the stimulus, as the stimuli made descriptive and injunctive norms salient, and therefore the respondents might have been inclined to be more consistent in their responses. Given that this difference in internal consistency is present only in scales that assessed descriptive and injunctive norms, but not moral norms or biospheric values, points toward these scales being affected by the stimulus and not response biases. However, future research should investigate this further.

3.3. Discussion

Congruent social norms have previously been found to have increased effectiveness in promoting pro-environmental intentions [47]. The results of Study 2 lend further support for the added effectiveness of presenting both descriptive and injunctive stimuli. Additionally, Study 2 demonstrated that descriptive imagery alone is not as effective as descriptive appeals and imagery presented together. It must be noted that we assessed intention not to litter only once, as it was a single item measure and assessing it twice would have introduced unpredictable confounding variance to the data. This means that our results, while informative, are limited by the fact that we could not assess within-group changes or make sure that groups were equal in their intention not to litter prior stimulation. The observed effects, however, are consistent with the literature and in the predicted direction, providing a solid starting point for more robust designs investigating the effects of imagery and appeals that send a congruent normative message.

Study 2 explored whether a simple normative stimulus is sufficient enough to affect the observers' values, moral, and social norms. As expected, no changes were observed, thus further supporting the idea that norms affect intentions and behaviors directly [12,48] and their effects are not apparent to the observer [15,16]. Results suggest that behavioral change or at least intention to change can occur under normative stimulation, but any shifts in internalized values or norms need repeated behaviors to form reliable patterns. Consistent repeated normative stimulation through PSAs might be a good way of achieving this end.

4. General Discussion

When striving for sustainable development, no resources should be wasted, especially those resources that are intended to promote sustainability. Furthermore, sustainable development goals require us to consider the matter holistically, taking into account societal well-being as well. Thus, designing effective PSAs becomes quite important in this context, as poorly designed ads may not only mean lost resources (design time and distribution costs), but lost opportunities and adverse effects (wasted viewing time and contrary effects of an inefficient PSA). Promoting sustainability goals needs to be an informed and coordinated effort with a strong evidence basis backing every decision; this also includes the design of public service announcements intended to promote sustainable behavior.

Two studies have been carried out to assess whether reinforcing imagery affects the emotional valence and effectiveness of pro-environmental PSAs. The first study revealed highly significant interaction effects between the type of appeal and image used in the stimuli, suggesting that a congruent positive and illustrated message elicits positive emotions that go beyond the individual effects of appeals or images alone. Previous research has shown that congruent normative messages are more effective than incongruent ones [47]; the present study extends this understanding to congruent imagery as well.

The second study suggests that descriptive norms presented as textual and visual stimuli are more effective than only a visual representation of descriptive norms. It may be that, as in the classical experiment by Cialdini, Reno, & Kallgren [9], presenting a clean environment might not be enough to make salient the descriptive norm of not littering and additional stimulation is needed to bring anti-littering norms to the mind of the observer. In the aforementioned classical example, the additional stimulation was a single piece of litter, while in the present study this was achieved by declaring the descriptive norm in the PSA. Overall, the results of the second study suggest that multimodal normative stimulation can potentially be an effective means of encouraging desirable prosocial behavior.

Previous research has shown that positive emotions, not negative ones, have a positive effect with engagement with pro-environmental messages [22,26,49]. People tend to be averse to unpleasant stimuli and tend not to engage with them, even if the stimuli relate to an important issue such as environmental conservation. Additionally, individuals are more motivated to action by pride, not guilt [22,49]. Negative emotions tend to lead us to avoidance behavior, while positive emotions, and especially pride, lead us to be more engaged.

Acting out of the feeling of pride might be a means of increasing one's subjective social standing and thus can potentially be a good motivator for behavior, while other positive emotions might add to the experience and reinforce it. Thus, it seems that PSAs should target positive emotions, not negative ones, to increase the likelihood of behavioral change and to increase the general effectiveness of the PSA (likelihood of repeated viewing and increased view time).

Although the studies presented in this article were exploratory and thus cannot provide definitive answers, we suggest that when designing PSAs one should focus on positive messages, even if that seems counterintuitive [41]. Presenting an example of a desirable behavior with an appeal that reports that behavior either as prevalent or increasing in prevalence both is more pleasant (thus increasing the likelihood of repeated viewing) and does not invoke guilt that could lead toward undesirable outcomes [22]. Above all, we believe that one should avoid naïve decisions in designing PSAs and should consider the available evidence basis on how to make PSAs more effective.

4.1. Directness of Normative Influence

The results provide initial support for assuming that norm-based PSAs affected both emotions and the intention not to litter directly, without eliciting a change in perceived descriptive norms, moral norms, or in biospheric values. This was expected as the current literature highlights the effectiveness of normative stimuli in the here-and-now [2,12,15,48]. It must be stressed, however, that because of the way moral norms and biospheric values were assessed, we cannot for certain say if these constructs really remained unaffected by the stimulus conditions, and future research that addresses this methodological shortcoming is needed to provide definitive answers. Nevertheless, our findings lead us to believe that individual change is not always necessary in order to elicit desirable behavior. This further solidifies descriptive and injunctive norm-based interventions as an immensely effective means for positive social change.

4.2. Limitations and Future Directions

As with all research, the studies presented in this paper have their limitations. Perhaps the most notable limitation of Study 2 is the analysis of behavioral change based only on participants' intention, which is not necessarily reflected in real behavior. Moreover, stimuli were presented via paper handed to participants. Although this increased the similarity of stimuli to real-life printed PSAs (in a form of leaflets or newspaper pages), it prevented accurate control of viewing time or even stimuli characteristics (such as size or shape, which could differ depending on viewing angle). Attentional, memory and other important factors related to effective PSAs were also ignored in the current study.

Some methodological limitations might have had an effect on the data. Therefore, this exploratory study should be interpreted as such. First of all, the limited sample size of Study 2 did not have sufficient statistical power to detect effects smaller than $d = 0.26$ with $1-\beta = 0.7$, thus resulting in an increased probability in Type II error for comparisons of descriptive norms, injunctive norms, moral norms, and biospheric values pre- and poststimulus. Additionally, although quite small, there remains a possibility that groups in Study 2 were different in their intention not to litter prior receiving the stimulus, thus increasing the possibility of Type I error for the comparison of intention between the groups. Given that we ran a lot of ANCOVAs in Study 1, when investigating emotion profiles elicited by different stimuli, the risk of Type I errors is increased for this analysis.

Additionally, the injunctive stimuli used in the studies might not necessarily be seen as injunctions in all contexts. We are confident that the stimuli were perceived as injunctions in our sample, but our stimuli were presented in Lithuanian, to Lithuanian participants, where that specific wording is seen as an injunction. Therefore, the translated English wording of the stimuli presented in this article should not be used in research done in English.

Future studies should consider testing whether PSAs that elicit positive affect increase the time spent examining a PSA and how this affects remembering of the contents of the PSA. Additionally, congruent descriptive and injunctive appeals that are accompanied with a positive descriptive image

should not be limited to a laboratory setting and also tested in the field, so as to gather real-life data on whether this type of stimulus is effective in eliciting actual behavior and not only intention. The two studies presented in this article provide promising insights, and we hope they will aid in constructing hypotheses for future experimental studies that utilize more robust controls and procedures and either preregister all analyses or correct for multiple comparisons in some way.

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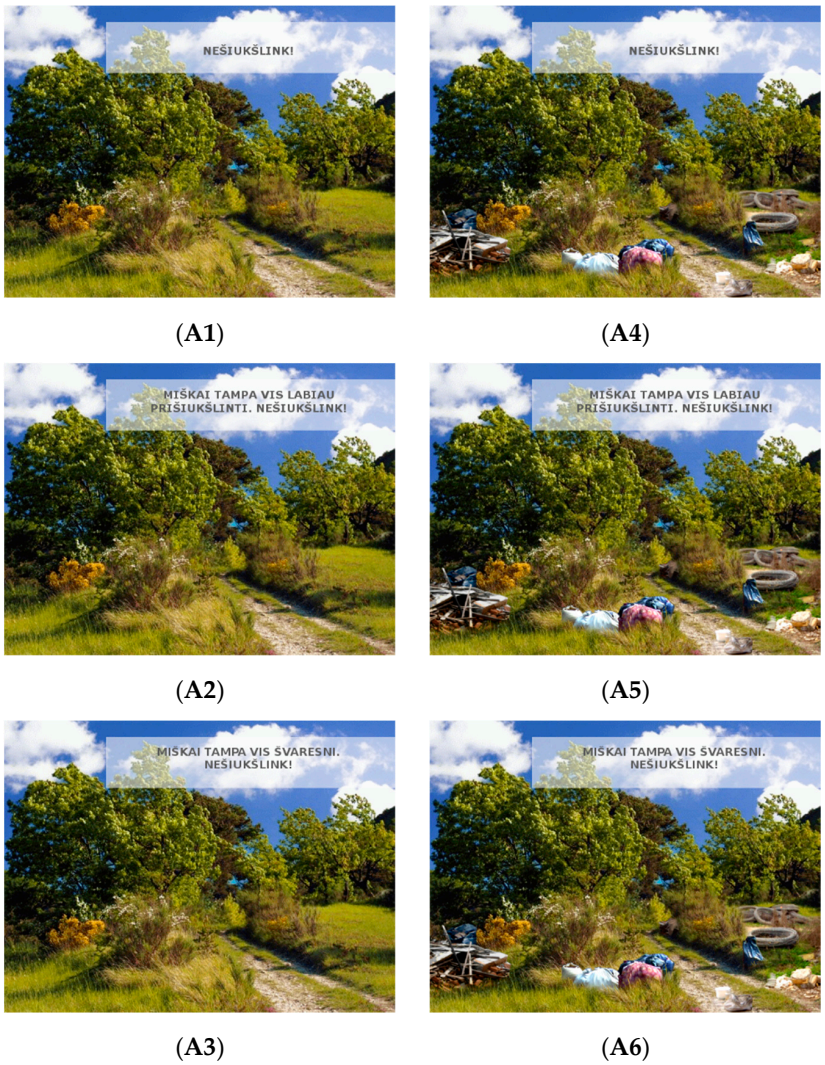
Appendix A

The visual stimuli used in the study. The appeals read in Lithuanian (from top to bottom): A1, A4 (only the injunction)—"DO NOT LITTER!"; A2, A5 (a negative descriptive norm and an injunction)—"FORESTS ARE FILLING UP WITH LITTER. DO NOT LITTER!"; A3, A6 (a positive descriptive norm and an injunction)—"FORESTS ARE BECOMING CLEANER. DO NOT LITTER!".



(**A1**) (**A4**)

(**A2**) (**A5**)

(**A3**) (**A6**)

Figure A1. The visual stimuli used in the study.

Appendix B

Intersecting triangles intended to induce cognitive load. The above text reads (in Lithuanian), "Count the triangles in the picture", and the bottom text reads, "Write the number of triangles here."

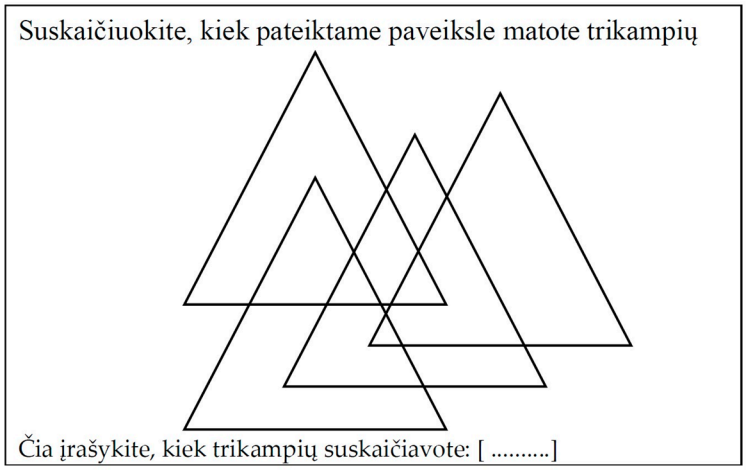


Figure A2. Stimulus used to induce cognitive load.

Appendix C

Table A1. ANCOVA results for all emotions measured with the Geneva Emotion Wheel (GEW) (controlled for openness, age, and sex).

	ANCOVA					M (SD)					
Cases	**Sum of Squares**	***df***	**Mean Square**	***F***	***p***	**Image of a Clean Forest**			**Image of a Littered Forest**		
						NDI	**PDI**	**I**	**NDI**	**PDI**	**I**
Interest						2.76 (1.3)	2.94 (1.29)	2.18 (1.43)	2.16 (1.72)	2.34 (1.69)	1.89 (1.51)
Type of appeal	18.037	2	9.019	4.061	0.018						
Type of image	15.608	1	15.608	7.028	0.008						
Appeal*Image	2.847	2	1.423	0.641	0.527						
Openness	13.181	1	13.181	5.935	0.015						
Age	0.525	1	0.525	0.236	0.627						
Sex	2.174	1	2.174	0.979	0.323						
Residual	697.319	314	2.221								
Amusement						1.71 (1.62)	3.15 (1.54)	1.71 (1.5)	0.64 (1.04)	0.84 (1.44)	0.56 (1.19)
Type of appeal	47.833	2	23.916	12.347	<0.001						
Type of image	182.218	1	182.218	94.07	<0.001						
Appeal*Image	29.086	2	14.543	7.508	<0.001						
Openness	0.033	1	0.033	0.017	0.897						
Age	2.469	1	2.469	1.274	0.26						
Sex	1.539	1	1.539	0.794	0.373						
Residual	606.295	313	1.937								
Pride						1.52 (1.58)	3.04 (1.53)	1.71 (1.47)	0.42 (0.79)	0.55 (1.05)	0.54 (1.07)
Type of appeal	42.307	2	21.154	13.038	<0.001						
Type of image	193.96	1	193.96	119.549	<0.001						
Appeal*Image	35.519	2	17.759	10.946	<0.001						
Openness	1.978	1	1.978	1.219	0.27						
Age	2.377	1	2.377	1.465	0.227						
Sex	11.749	1	11.749	7.242	0.008						
Residual	509.443	314	1.622								

Table A1. *Cont.*

Cases	ANCOVA					M (SD)					
	Sum of Squares	*df*	Mean Square	*F*	*p*	Image of a Clean Forest			Image of a Littered Forest		
						NDI	PDI	I	NDI	PDI	I
Joy						1.75 (1.75)	3.35 (1.56)	2.17 (1.69)	0.54 (1.08)	0.88 (1.44)	0.73 (1.39)
Type of appeal	53.316	2	26.658	12.013	<0.001						
Type of image	224.676	1	224.676	101.25	<0.001						
Appeal*Image	30.588	2	15.294	6.892	0.001						
Openness	6.334	1	6.334	2.854	0.092						
Age	1.788	1	1.788	0.806	0.37						
Sex	4.72	1	4.72	2.127	0.146						
Residual	707.864	319	2.219								
Pleasure						1.88 (1.77)	3.22 (1.68)	2.38 (1.8)	0.5 (0.97)	0.81 (1.34)	0.67 (1.22)
Type of appeal	37.143	2	18.571	8.34	<0.001						
Type of image	267.781	1	267.781	120.256	<0.001						
Appeal*Image	19.079	2	9.54	4.284	0.015						
Openness	1.537	1	1.537	0.69	0.407						
Age	0.715	1	0.715	0.321	0.571						
Sex	1.824	1	1.824	0.819	0.366						
Residual	714.791	321	2.227								
Contentment						1.64 (1.76)	2.91 (1.68)	1.87 (1.67)	0.39 (0.73)	0.71 (1.27)	0.67 (1.25)
Type of appeal	34.775	2	17.387	8.472	<0.001						
Type of image	188.738	1	188.738	91.963	<0.001						
Appeal*Image	21.747	2	10.874	5.298	0.005						
Openness	4.596	1	4.596	2.24	0.136						
Age	2.618	1	2.618	1.275	0.26						
Sex	5.942	1	5.942	2.895	0.09						
Residual	654.694	319	2.052								
Love						1.98 (1.75)	2.54 (1.75)	2.27 (1.7)	0.48 (0.87)	1.14 (1.61)	0.88 (1.4)
Type of appeal	19.372	2	9.686	4.08	0.018						
Type of image	160.726	1	160.726	67.701	<0.001						
Appeal*Image	0.363	2	0.181	0.076	0.926						
Openness	7.519	1	7.519	3.167	0.076						
Age	2.373	1	2.373	1	0.318						
Sex	0.353	1	0.353	0.149	0.7						
Residual	764.449	322	2.374								
Admiration						2.38 (1.95)	3.14 (1.61)	2.76 (1.67)	0.57 (1.01)	0.89 (1.28)	0.58 (1.16)
Type of appeal	15.753	2	7.877	3.577	0.029						
Type of image	337.59	1	337.59	153.332	<0.001						
Appeal*Image	4.291	2	2.146	0.975	0.378						
Openness	6.282	1	6.282	2.853	0.092						
Age	0.008	1	0.008	0.004	0.952						
Sex	0.284	1	0.284	0.129	0.72						
Residual	706.745	321	2.202								
Relief						1.84 (1.74)	2.74 (1.72)	2.2 (1.75)	0.52 (0.95)	0.93 (1.31)	0.68 (1.31)
Type of appeal	24.464	2	12.232	5.549	0.004						
Type of image	185.71	1	185.71	84.245	<0.001						
Appeal*Image	4.909	2	2.455	1.113	0.33						
Openness	12.23	1	12.23	5.548	0.019						
Age	0.098	1	0.098	0.044	0.834						
Sex	9.904	1	9.904	4.493	0.035						
Residual	714.227	324	2.204								
Compassion						2.52 (1.61)	0.76 (1.32)	1.77 (1.75)	2.69 (1.84)	2.91 (1.73)	2.85 (1.75)
Type of appeal	33.354	2	16.677	6.037	0.003						
Type of image	109.702	1	109.702	39.71	<0.001						
Appeal*Image	48.148	2	24.074	8.714	<0.001						
Openness	19.999	1	19.999	7.239	0.008						
Age	2.94	1	2.94	1.064	0.303						
Sex	0.097	1	0.097	0.035	0.852						
Residual	870.224	315	2.763								

Table A1. *Cont.*

Cases	ANCOVA					M (SD)					
	Sum of Squares	*df*	Mean Square	*F*	*p*	Image of a Clean Forest			Image of a Littered Forest		
						NDI	PDI	I	NDI	PDI	I
Sadness						2.8 (1.79)	0.96 (1.43)	2.11 (1.76)	3.6 (1.62)	3.7 (1.37)	4 (1.27)
Type of appeal	50.12	2	25.06	10.499	<0.001						
Type of image	281.653	1	281.653	118.004	<0.001						
Appeal*Image	51.182	2	25.591	10.722	<0.001						
Openness	7.134	1	7.134	2.989	0.085						
Age	0.24	1	0.24	0.101	0.751						
Sex	11.877	1	11.877	4.976	0.026						
Residual	768.553	322	2.387								
Guilt						2.11 (1.64)	0.69 (1.03)	1.58 (1.62)	2.28 (1.6)	2.53 (1.59)	2.62 (1.54)
Type of appeal	23.478	2	11.739	5.22	0.006						
Type of image	94.686	1	94.686	42.104	<0.001						
Appeal*Image	34.171	2	17.086	7.597	<0.001						
Openness	18.003	1	18.003	8.005	0.005						
Age	0.002	1	0.002	8.516e -4	0.977						
Sex	7.261	1	7.261	3.229	0.073						
Residual	721.889	321	2.249								
Regret						2.5 (1.71)	0.93 (1.45)	1.93 (1.74)	3.28 (1.74)	3.37 (1.59)	3.78 (1.33)
Type of appeal	43.991	2	21.996	9.208	<0.001						
Type of image	252.893	1	252.893	105.872	<0.001						
Appeal*Image	35.801	2	17.9	7.494	<0.001						
Openness	33.959	1	33.959	14.217	<0.001						
Age	9.19	1	9.19	3.847	0.051						
Sex	13.441	1	13.441	5.627	0.018						
Residual	773.928	324	2.389								
Shame						2.39 (1.8)	0.91 (1.43)	1.56 (1.77)	3.36 (1.71)	3.65 (1.67)	3.72 (1.34)
Type of appeal	20.237	2	10.119	3.828	0.023						
Type of image	335.029	1	335.029	126.733	<0.001						
Appeal*Image	43.238	2	21.619	8.178	<0.001						
Openness	10.952	1	10.952	4.143	0.043						
Age	2.866	1	2.866	1.084	0.299						
Sex	2.297	1	2.297	0.869	0.352						
Residual	856.518	324	2.644								
Disappointment						2.68 (1.72)	0.75 (1.44)	2.29 (1.89)	3.95 (1.23)	4.12 (1.32)	4.13 (1.29)
Type of appeal	50.785	2	25.392	11.538	<0.001						
Type of image	405.13	1	405.13	184.081	<0.001						
Appeal*Image	63.921	2	31.961	14.522	<0.001						
Openness	11.836	1	11.836	5.378	0.021						
Age	1.01	1	1.01	0.459	0.499						
Sex	2.378	1	2.378	1.081	0.299						
Residual	713.065	324	2.201								
Fear						1.89 (1.72)	0.6 (0.97)	1.28 (1.49)	2.16 (1.78)	2.13 (1.57)	2 (1.52)
Type of appeal	25.008	2	12.504	5.57	0.004						
Type of image	71.144	1	71.144	31.692	<0.001						
Appeal*Image	18.838	2	9.419	4.196	0.016						
Openness	24.182	1	24.182	10.772	0.001						
Age	2.042	1	2.042	0.909	0.341						
Sex	11.409	1	11.409	5.082	0.025						
Residual	713.855	318	2.245								
Disgust						2.04 (1.85)	0.5 (0.97)	1.11 (1.56)	3.47 (1.59)	3.54 (1.49)	3.93 (1.49)
Type of appeal	30.252	2	15.126	6.623	0.002						
Type of image	500.36	1	500.36	219.075	<0.001						
Appeal*Image	40.199	2	20.1	8.8	<0.001						
Openness	11.641	1	11.641	5.097	0.025						
Age	0.661	1	0.661	0.289	0.591						
Sex	0.563	1	0.563	0.246	0.62						
Residual	728.586	319	2.284								

Table A1. *Cont.*

Cases	ANCOVA					M (SD)					
	Sum of Squares	*df*	Mean Square	*F*	*p*	Image of a Clean Forest			Image of a Littered Forest		
						NDI	PDI	I	NDI	PDI	I
Contempt						1.75 (1.58)	0.42 (0.85)	1.06 (1.51)	2.39 (1.82)	2.89 (1.55)	2.79 (1.65)
Type of appeal	8.846	2	4.423	1.923	0.148						
Type of image	229.291	1	229.291	99.669	<0.001						
Appeal*Image	44.912	2	22.456	9.761	<0.001						
Openness	10.941	1	10.941	4.756	0.03						
Age	0.956	1	0.956	0.415	0.52						
Sex	0.028	1	0.028	0.012	0.913						
Residual	731.569	318	2.301								
Hate						1.89 (1.83)	0.5 (1.04)	1.13 (1.53)	2.13 (1.81)	2.72 (1.64)	3.02 (1.57)
Type of appeal	14.29	2	7.145	2.811	0.062						
Type of image	182.879	1	182.879	71.938	<0.001						
Appeal*Image	60.303	2	30.152	11.861	<0.001						
Openness	9.615	1	9.615	3.782	0.053						
Age	0.989	1	0.989	0.389	0.533						
Sex	0.42	1	0.42	0.165	0.685						
Residual	816.032	321	2.542								
Anger						2.34 (1.72)	0.69 (1.26)	1.77 (1.76)	3.32 (1.59)	3.68 (1.42)	4.02 (1.42)
Type of appeal	31.934	2	15.967	6.757	0.001						
Type of image	368.729	1	368.729	156.053	<0.001						
Appeal*Image	56.965	2	28.483	12.054	<0.001						
Openness	2.784	1	2.784	1.178	0.279						
Age	7.599	1	7.599	3.216	0.074						
Sex	1.162	1	1.162	0.492	0.484						
Residual	763.197	323	2.363								

Note: NDI—negative descriptive appeal with an injunction; PDI—positive descriptive appeal with an injunction; I—injunctive appeal only.

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